

(19)日本国特許庁 (J P)

(12) 公 開 特 許 公 報 (A)

(11)特許出願公開番号  
特開2002-120342  
(P2002-120342A)

(43)公開日 平成14年4月23日(2002.4.23)

(51)Int.Cl. <sup>7</sup>	識別記号	F I	テ-マコード(参考)
B 3 2 B 27/32	1 0 1	B 3 2 B 27/32	1 0 1 4 F 0 0 6
7/02	1 0 4	7/02	1 0 4 4 F 1 0 0
C 0 8 J 7/04	C E R	C 0 8 J 7/04	C E R D
	C E Z		C E Z D
C 0 9 K 3/16	1 0 2	C 0 9 K 3/16	1 0 2 J
審査請求 未請求 請求項の数 6 O L (全 8 頁) 最終頁に続く			

(21)出願番号 特願2000-316921(P2000-316921)

(22)出願日 平成12年10月17日(2000.10.17)

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(54)【発明の名称】 帯電防止シート状物

(57)【要約】

【課題】 シート状物の裏面にコート層を設けることにより、表面に優れた帯電防止効果が付与されると共に、帯電防止性能の付与が印刷等の加工の妨げとならない帯電防止シート状物を提供するにある。

【解決手段】 表面及び裏面を有するシート状物と、該シート状物の裏面に施された、カリウム及びアルカノールアミン中和型アイオノマー或いはカリウム中和アイオノマーとグリセリンまたは分子量が250以下のポリエチレングリコールとの組成物のコート層とからなり、シート状物の表面には帯電防止性が付与されていることを特徴とする帯電防止シート状物。

## 【特許請求の範囲】

【請求項 1】 表面及び裏面を有するシート状物と、該シート状物の裏面に施された、カリウム及びアルカノールアミン中和型アイオノマー或いはカリウム中和アイオノマーとグリセリンまたは分子量が 250 以下のポリエチレングリコールとの組成物のコート層とからなり、シート状物の表面には帯電防止性が付与されていることを特徴とする帯電防止シート状物。

【請求項 2】 アイオノマーのベース樹脂が不飽和カルボン酸含量が 10～35 重量%のエチレン・不飽和カルボン酸共重合体 (A) であり、該共重合体のカルボキシル基を基準にして、70～100 モル%に相当する量のカリウムイオンで中和され且つ 1～40 モル%に相当する量のアルカノールアミンで中和されていることを特徴とする請求項 1 に記載の帯電防止シート状物。

【請求項 3】 アイオノマーのベース樹脂が不飽和カルボン酸含量が 10～35 重量%のエチレン・不飽和カルボン酸共重合体 (A) であり、該共重合体のカルボキシル基を基準にして、70～100 モル%に相当する量のカリウムイオンで中和され、グリセリンまたは分子量が 250 以下のポリエチレングリコールが共重合体 (A) 当たり 0.1～9 重量%の範囲で含有されていることを特徴とする請求項 1 に記載の帯電防止シート状物。

【請求項 4】 前記シート状物が熱可塑性樹脂フィルムであることを特徴とする請求項 1 乃至 3 の何れかに記載の帯電防止シート状物。

【請求項 5】 前記コート層が 0.1 乃至 20  $\mu\text{m}$  の厚みで形成されていることを特徴とする請求項 1 乃至 4 の何れかに記載の帯電防止シート状物。

【請求項 6】 前記コート層が水性分散液の形で施されたものであることを特徴とする請求項 1 乃至 5 の何れかに記載の帯電防止シート状物。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、帯電防止シート状物に関するもので、より詳細にはシート状物の裏面に特定の樹脂組成物のコート層が設けられることにより、表面には全く処理なしにも帯電防止性が付与されたシート状物に関する。

## 【0002】

【従来の技術】プラスチック、繊維、紙等を取り扱う場合、これらが帯電することにより、種々の静電気障害を起こすことがある。これを防止するために、一般には帯電防止剤が使用されている。帯電防止剤として、アニオン系、カチオン系、ノニオン系の界面活性剤のような低分子型有機化合物が知られており、これらは、成形物の表面に塗布したり、あるいは表面への移行性を利用して、材料を構成する高分子化合物に配合したりして、使用されている。

【0003】このような低分子型帯電防止剤は、効力の

持続性に問題があるため、高分子型帯電防止剤を使用することも行われている。この場合も、材料を構成する高分子化合物に配合する方法と共に、成形物表面に薄い帯電防止性膜を形成するために、液状の帯電防止剤を塗布する方法が採用されている。

【0004】液状の帯電防止剤を塗布する手法は、材料を構成する高分子化合物に配合する方法に較べ、幾つかの優位点がある。例えば、高分子型帯電防止剤を配合した場合には、その相溶性不良により成形品の物性が大きく変化してしまう可能性が高く、場合によっては成形加工そのものが不可能になる場合がある。これに対し、塗布タイプの帯電防止剤は、成形品のモルホロジーに全く影響することなく、表面にのみ充分な非帯電性を与えることができる。また配合タイプでは、加工品に対して大量の帯電防止剤を使用する必要があるのに対して、塗布タイプのものを使用すれば、実際に必要なのは、表層数  $\mu\text{m}$  の層を形成するのに必要な少量で足りる。このような有利な点をもつ塗布型帯電防止剤、とくに環境、ハンドリング性を考慮した水性分散液は、様々な帯電防止用途が期待でき、様々な種類の帯電防止分散液が開発されてきた。

【0005】このような液状の高分子型帯電防止剤の一つとして、エチレン・不飽和カルボン酸共重合体のカリウム塩の水性分散液が知られている。この水性分散液は、帯電防止効果の持続性が優れた塗布膜を形成することが可能であるが、乾燥状態では非帯電性が低下するという欠点を有している。このような欠点を改善する目的で、ポリオキシアルキレングリコールや多価水酸基含有化合物を水性分散液に添加しておく方法が、特開平 4-339849 号や特開平 8-231791 号の各公報で提案されている。

【0006】カリウム塩型のアイオノマーと多価アルコールとの樹脂組成物を中間層として押し出し、防塵性積層体を製造することも既に知られており、特開平 10-193495 号公報には、表面層の少なくとも 1 層が熱可塑性樹脂層である 3 層以上の層からなる積層体において、該熱可塑性樹脂層に隣接する少なくとも一つの中間層に、熱可塑性樹脂 (A)、エチレン・不飽和カルボン酸共重合体のカリウムアイオノマー (B) 及びポリヒドロキシ化合物 (C) からなり、(B) が少なくとも 5 重量%以上、(C) が (B) に対し 0.1～30 重量%の割合で混合されてなる非帯電性層を設けてなる防塵性積層体が記載されている。

## 【0007】

【発明が解決しようとする課題】シート状物の帯電防止処理では、上記従来技術に認められるとおり、帯電防止すべき表面に帯電防止剤を塗布するのが一般的である。ところが、フィルム表面には印刷等の加工処理を施す必要があるが、帯電防止剤の塗布は印刷不良などを引き起こすなどの問題を生じやすい。

【0008】中間層としてアイオノマー組成物を設けることにより、積層体の表面樹脂層に帯電防止性能を付与することは、表面樹脂層への印刷性を損なわないという優れた利点を与えるものであるが、この従来技術の手段では、中間層の押出と積層という面倒な操作が必要であり、より簡単なコーティング等の手段でフィルム等のシート状物に帯電防止性能を付与できることが望まれている。

【0009】本発明者らは、カリウム及びアルカノールアミン中和型アイオノマー或いはカリウム中和アイオノマーとグリセリンまたは分子量が250以下のポリエチレングリコールとの組成物をシート状物の裏面にコートすることにより、シート状物の表面に何らの処理を施すことなしにも帯電防止性を付与できることを見出した。即ち、本発明の目的は、シート状物の裏面にコート層を設けることにより、表面に優れた帯電防止効果が付与されると共に、帯電防止性能の付与が印刷等の加工の妨げとならない帯電防止シート状物を提供することにある。

【0010】

【課題を解決するための手段】本発明によれば、表面及び裏面を有するシート状物と、該シート状物の裏面に施されたカリウム及びアルカノールアミン中和型アイオノマー或いはカリウム中和アイオノマーとグリセリンまたは分子量が250以下のポリエチレングリコールとの組成物のコート層とからなり、シート状物の表面には帯電防止性が付与されていることを特徴とする帯電防止シート状物が提供される。本発明の帯電防止シート状物では、

1. アイオノマーのベース樹脂が不飽和カルボン酸含量が10～35重量%のエチレン・不飽和カルボン酸共重合体(A)であり、該共重合体のカルボキシル基を基準にして、70～100モル%に相当する量のカリウムイオン及び1～40モル%に相当する量のアルカノールアミンで中和されていること、

1. アイオノマーのベース樹脂が不飽和カルボン酸含量が10～35重量%のエチレン・不飽和カルボン酸共重合体(A)であり、該共重合体のカルボキシル基を基準にして、70～100モル%に相当する量のカリウムイオンで中和され、グリセリンまたは分子量が250以下のポリエチレングリコールが該共重合体(A)当たり0.1乃至9重量%の量で含有されていること、及び1～40モル%に相当する量のアルカノールアミンで中和されていること、

3. 前記シート状物が熱可塑性樹脂フィルムであること、

4. 前記コート層が0.1乃至20 $\mu$ mの厚みで形成されていること、

5. 前記コート層が水性分散液の形で施されたものであること、が好ましい。

【0011】

【発明の実施形態】〔作用〕本発明は、カリウム及びアルカノールアミン中和型アイオノマーを含有するコーティング組成物或いはカリウム中和アイオノマーとグリセリンまたは分子量が250以下のポリエチレングリコールとのコーティング組成物をシート状物の裏面に施すと、表面に何らの処理なしにも帯電防止性が付与されるという知見に基づくものである。即ち、帯電防止剤の塗布面に帯電防止性能が付与されることはきわめて当然のことであるが、本発明においては、後述する例に示すとおり、コーティング組成物の塗布面のみならず、塗布面の反対側の面である表面にも帯電防止性能が付与されるのである。しかも、この帯電防止性能の付与は、正帯電に対しても負帯電に対しても全く同様に行われるのである。

【0012】シート状物表面の帯電防止性能は、測定すべき表面を所定の表面電位に帯電させ、その後時間の経過による表面電位の減衰特性を測定し、一定レベルに表面電位が減衰するまでの時間を求めることにより、評価することができる。

【0013】樹脂成形体の帯電防止に広く使用されている界面活性剤系の帯電防止剤を、シート状物に塗布した場合、塗布面の帯電防止性能は十分満足しうるものであるが、塗布面と反対側の面の表面電位半減時間は無限大である(後述する比較例参照)のに対して、前記コーティング組成物をシート状物に施した場合には、塗布面は勿論のこと、その反対側の表面における表面電位半減時間も1秒以下に抑制される(後述する実施例参照)のであって、これは本発明による予想外の効果である。

【0014】本発明において、裏面に施されたコーティング層が表面の帯電を有効に抑制することは、多数の実験の結果現象として見いだされたものであり、その理由は未だ十分明らかではない。しかしながら、本発明者らの推測によると、本発明に用いるカリウム及びアルカノールアミン中和型アイオノマーを含有するコート層は、電荷誘導による電荷(電子、正孔)の発生能と電荷の輸送性とに優れており、表面電荷に対応して裏面に反対電荷(正孔、電子)が誘導されて、内部電界が迅速に形成され、これが外部電界の緩和乃至消滅、即ち帯電防止に役立っていると思われる。このことは、正帯電に対しても負帯電に対しても表面電位の減衰が迅速に生じるという事実によって裏付けられる。これは、カリウムイオン、アルカノールアミンという2種類のカウンターカチオンの存在と関係しているのかもしれない。カリウム中和アイオノマーとグリセリンまたは分子量が250以下のポリエチレングリコールでは他の機構が関与しているのかもしれない。勿論、上記の推定は、何らかの意味においても本発明を拘束するものではない。

【0015】〔帯電防止性シート状物〕本発明の帯電防止シート状物は、図1に示すとおり、シート状物1とその裏面に施されたコート層2とからなっている。このコ

ート層2はカリウム及びアルカノールアミン中和型アイオノマーを含有するコーティング組成物或いはカリウム中和アイオノマーとグリセリン或いは分子量250以下のポリエチレングリコールとの組成物から形成されており、シート状物1の表面3には、何らの処理なしにも帯電防止性が付与されている。

【0016】【コート層組成物】本発明に用いるコーティング組成物は、カリウム及びアルカノールアミン中和型アイオノマー或いはカリウム中和アイオノマーとグリセリン或いは分子量250以下のポリエチレングリコールとの組成物を含有している。

(1) カリウム及びアルカノールアミン中和型アイオノマー

本発明に用いるカリウム中和アイオノマーは、カチオン種としてカリウムイオンとアルカノールアミンとを含有するものであればいずれも使用可能であるが、帯電防止性の点で、不飽和カルボン酸含量が10～35重量%のエチレン・不飽和カルボン酸共重合体(A)をベースとするものであることが好ましい。

【0017】このアイオノマーのベースポリマーとなるエチレン・不飽和カルボン酸共重合体としては、不飽和カルボン酸含有量が10～35重量%、好ましくは12～30重量%の共重合体である。共重合体における不飽和カルボン酸含量が少なすぎると、分散性や安定性の良好な分散液を得ることが難しく、また帯電防止性良好な塗布膜を形成することが困難となる。一方、不飽和カルボン酸含量が上記範囲より多い共重合体を使用すると、安定な分散液が得られないのみならず、形成される塗布膜の耐水性、機械的強度の低下が起こるので好ましくない。このようなエチレン・不飽和カルボン酸共重合体は、エチレンと不飽和カルボン酸の二元共重合体のみならず、任意に他の単量体が共重合された多元共重合体であってもよく、任意の他の単量体は、例えば、0～40重量%、好ましくは0～20重量%の量で共重合されていてもよい。

【0018】ここに、不飽和カルボン酸としては、アクリル酸、メタクリル酸、エタクリル酸、マレイン酸、フマル酸、イタコン酸、無水マレイン酸、無水イタコン酸、マレイン酸モノメチル、マレイン酸モノエチルなどを例示することができる。とくに好ましいのは、アクリル酸又はメタクリル酸である。

【0019】上記の任意に共重合されていてもよい他の単量体としては、酢酸ビニル、プロピオン酸ビニルのようなビニルエステル、アクリル酸メチル、アクリル酸エチル、アクリル酸イソプロピル、アクリル酸イソブチル、アクリル酸nブチル、アクリル酸イソオクチル、アクリル酸-2-エチルヘキシル、メタクリル酸メチル、メタクリル酸エチル、メタクリル酸イソブチル、マレイン酸ジメチル、マレイン酸ジエチルなどの不飽和カルボン酸エステル、一酸化炭素、二酸化硫黄などを例示する

ことができる。

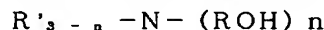
【0020】エチレン・不飽和カルボン酸共重合体としてはまた、190℃、2160g荷重におけるメルトフローレートが1～2000g/10分、好ましくは10～1500g/10分の範囲のものを使用するのが望ましい。すなわち、メルトフローレートの非常に低いものをを用いた場合には、良好な分散液を得ることが難しく、またその値が非常に大きいものを使用すると、溶液から得られる塗布膜の強度が不足するので好ましくない。

【0021】これらエチレン共重合体は、構成する単量体を、高圧ラジカル重合法によって共重合することにより、得ることができる。

【0022】アイオノマー樹脂成分は、上記エチレン共重合体のカルボキシル基を基準にして、70～100モル%、好ましくは75～98モル%に相当する量のカリウムイオン及び1～40モル%、好ましくは5～30モル%のアルカノールアミンで中和してなるものである。

【0023】すなわち、カリウムイオンの代わりに、リチウムイオンやナトリウムイオンを用いても帯電防止性に優れた塗布膜を生成しうる溶液を得ることができない。また、カリウムイオンの量が前記範囲より少なくなると、同様に帯電防止性良好な塗布膜を形成しうる溶液を得ることはできず、またその量が前記範囲を越えると、安定な分散液を得ることはできない。

【0024】一方、他方の中和成分であるアルカノールアミンとしては、下記一般式(1)



式中、Rはアルキレン基であり、nは1乃至3の数であり、R'は水素原子またはアルキル基である、で示されるものが使用される。このなかでも、ジエタノールアミン、ジプロパノールアミン、ジペンタノールアミン、N-メチルエタノールアミン及びN-エチルプロパノールアミンが好ましく、ジエタノールアミンが最も好ましい。

【0025】上記アルカノールアミンは、前述した量比で使用される。アルカノールアミンの量が、上記範囲よりも多い場合にも、また上記範囲よりも少ない場合にも、帯電防止性能、特に低湿度条件下での帯電防止性能が低下するので、好ましくない。

【0026】(2) コーティング組成物

シート状物に対するコーティング組成物は水性分散液からなっていることが好ましい。この分散液を製造するには、上記ベースポリマーのカリウム及びアルカノールアミン中和物を含有する水性分散液を製造する。この水性分散液を製造するには、同時添加法や逐次添加法が用いられる。すなわち、同時添加法では、原料のエチレン・(メタ)アクリル酸共重合体と、カリウム化合物及びアルカノールアミンとを、各所定量使用し、80℃以上、好ましくは95℃以上の温度で、攪拌しながら、水中で反応させることによって得られる。ここに、カリウム化

合物としては、水酸化物、炭酸塩、炭酸水素塩、カルボン酸塩などを例示することができる。

【0027】この方法においては、水と、固型分濃度が5～40重量%、好ましくは10～30重量%となる量の上記した性状のエチレン・(メタ)アクリル酸共重合体と、該共重合体のカルボキシル基を基準にして、70～100モル%のイオン化する量の上記カリウム化合物と、前述した量のアルカノールアミンとを、例えば攪拌機付きのオートクレーブ中、所定温度で剪断力をかけながら反応させることによって、水性分散体を得ることができる。反応時間は、反応温度やその他反応条件によっても異なるが、30～120分程度である。同時添加法では、添加操作や反応操作が簡単で、処理も容易であり、製造コストも低いという利点がある。

【0028】かくして得られる水性分散液は、例えば、平均粒径が1～500nm、好ましくは5～400nmの範囲にあり、また粘度が10～2000mPa・s、好ましくは50～1000mPa・sの範囲にある。勿論、原料となる水性分散液は、逐次添加法でも製造することができ、この場合には、予め調製したエチレン・不飽和カルボン酸共重合体のカリウムイオン中和物の水性分散液に、アルカノールアミンを配合すればよい。

【0029】本発明においては、カリウム及びアルカノールアミン中和型アイオノマーの代わりに、カリウム中和型アイオノマーとグリセリン或いは分子量250以下のポリエチレングリコールとの組成物を用いることができる。カリウム中和型のアイオノマーとしては、前述した手段で得られるカリウム中和のものが使用される。多価アルコールの内でも、グリセリン或いはポリエチレングリコールを用いることが重要であり、例えばポリプロピレングリコールを用いたのでは、低湿度条件下で満足すべき帯電防止性は得られない。また、ポリエチレングリコールを用いる場合、分子量が250以下であることも重要であり、分子量が上記範囲よりも大きいポリエチレングリコールを用いたのでは、やはり低湿度条件下で満足すべき帯電防止性は得られない。上記グリセリン或いはポリエチレングリコールは、エチレン・不飽和カルボン酸共重合体(A)当たり、0.1～9重量%の量で使用される。この量が、上記範囲よりも多い場合にも、また上記範囲よりも少ない場合にも、低湿度条件下での帯電防止性能が低下するので、好ましくない。

【0030】本発明において、製造されたままの水性分散液中に含有されている水分を、所望により、共沸蒸留などの手段で系外に除去し、或いはこの水性分散液を水で希釈することにより、その固形分濃度を調整することができる。本発明に用いる帯電防止用水性分散液は、固形分濃度が10乃至40重量%、特に20乃至30重量%の範囲にあるのが、帯電防止性能や塗布性の点で好ましい。

【0031】本発明に用いる帯電防止用分散液には、任

意に種々の添加剤を配合することができる。このような添加剤の例としては、エチレングリコールなどの他の多価アルコール、エポキシ化合物、メタノール、エタノール、nプロパノール、イソプロパノールのような低級アルコール、プロピレングリコールモノアセテート、エチレングリコールモノアセテートのようなエステル類等の他の有機溶媒、酸化防止剤、紫外線吸収剤、光安定剤、可塑剤、顔料、染料、滑剤、ブロッキング防止剤、接着剤、抗菌剤、架橋剤、筆記性改良剤、無機充填剤、発泡剤などを挙げることができる。

【0032】この有機溶液はまた、他の重合体の溶液乃至分散液と混合して使用することが可能であり、例えば低温での保存性を向上させる目的で、他の重合体溶液乃至分散液を混合することができる。この場合、上記水性分散液/他の重合体溶液乃至分散液の混合比は、固型分換算(重量比)で99.9/0.1～90/10とするのがよい。

【0033】このような他の重合体の溶液乃至分散液としては、例えば、ポリ酢酸ビニル、エチレン・酢酸ビニル共重合体、ポリ塩化ビニル、ポリ塩化ビニリデン、水溶性アクリル樹脂、アクリルアミド樹脂、メタアクリルアミド樹脂、アクリロニトリル樹脂、メタアクリロニトリル樹脂、スチレン・アクリル酸共重合体、水溶性ポリウレタン樹脂、水溶性スチレン・マレイン酸共重合体、スチレン・ブタジエン共重合体、ハイインパクトポリスチレン樹脂、ブタジエン樹脂、ポリエステル樹脂、アクリロニトリル・ブタジエン共重合体、ポリエチレン、酸化ポリエチレン、プロピレン・エチレン共重合体、無水マレイン酸グラフトポリオレフィン、塩素化ポリエチレン、塩素化ポリプロピレン、EPDM、フェノール樹脂、シリコーン樹脂、エポキシ樹脂等の溶液を挙げることができる。これらは勿論、2種以上使用してもよい。

【0034】[シート状物]本発明において、帯電防止性を付与するためのシート状物としては、帯電しやすい各種樹脂フィルム乃至シートや繊維質シート或いはこれらの2種以上からなる積層フィルム乃至シートを挙げることができる。例えば、このようなシート状物としては、高-、中-、低-密度ポリエチレン、線状低密度ポリエチレン、エチレン・ $\alpha$ -オレフィン共重合体、エチレン・酢酸ビニル共重合体、エチレン・(メタ)アクリル酸エステル共重合体、エチレン・(メタ)アクリル酸・(メタ)アクリル酸エステル共重合体又はそのアイオノマー、ポリプロピレン、ポリ-1-ブテン、ポリ-4-メチル-1-ペンテンのようなオレフィン重合体又は共重合体、ポリスチレン、ハイインパクトポリスチレン、ABS型樹脂、スチレン・ブタジエンブロック共重合体又はその水素添加物のようなスチレン系樹脂、ポリエチレンテレフタレート、ポリブチレンテレフタレートのようなポリエステル、ナイロン6、ナイロン66

のようなポリアミド、ポリカーボネート、ポリ塩化ビニル及びこれらの任意割合の混合物などの熱可塑性重合体乃至熱可塑性エラストマーのフィルム乃至シートが挙げられる。このフィルムは、勿論単層でもよく、また複数の樹脂層からなる積層フィルム乃至シートであってもよい。繊維質シートとしては、オレフィン系樹脂、ポリアミド樹脂、ポリエステル樹脂、アクリル樹脂、ポリビニルアルコール、塩素含有重合体からなる合成紙、不織布シート、織布シートなどが挙げられる。シート状物へのコーティング組成物の塗布性を向上させるために、シート状物の表面を、必要により、コロナ処理、オゾン処理、火炎処理などのそれ自体公知の表面処理に付することもできる。本発明は、特に樹脂フィルムの帯電防止に有効であり、樹脂フィルムの厚みは一般的にいて、10乃至200 $\mu\text{m}$ の厚みを有するものが好ましい。

【0035】[コート層の形成]シート状基材にアイオノマーの分散液を塗布するには、公知の方法、例えばロールコーティング、バーコーター、エアナイフコーター、刷毛塗り、スプレー塗布などによりコーティングしたり、あるいは基材をコーティング用有機溶液に浸漬する方法等を採用することができる。基材には、接着性等を改良する目的で下塗り剤を塗布しておいてもよく、また表面処理を施しておいてもよい。塗布膜の厚みは任意であるが、通常0.1~20 $\mu\text{m}$ 、好ましくは0.2~15 $\mu\text{m}$ である。塗布膜には、耐水性、耐久性等を改良する目的で、電子線照射による架橋処理を施してもよい。

【0036】

【実施例】以下に実施例を挙げて本発明を具体的に説明する。なお、実施例において用いたシート状物及びコート層の形成に用いた組成物は次の通りである。

【0037】シート状物：

ポリエステル(PET)フィルム

商品名 東レ株式会社製 ルミラー

厚さ 55 $\mu\text{m}$

低密度ポリエチレン(LDPE)

商品名 三井化学株式会社製 ミラソン16

厚さ 46 $\mu\text{m}$

【0038】コート用組成物：

アイオノマー水性分散体(IODと表記)：

ベースポリマー エチレン・メタクリル酸共重合体

メタクリル酸含量 20重量%、

MFR 60g/10min

イオン添加量 Kイオン カルボキシル基当たり90モル%

ジェタノールアミン 20モル%

樹脂濃度25重量%の水性分散体

界面活性剤型帯電防止液

花王株式会社製 エレクトロストリッパーQN

【0039】帯電防止性の評価は次の通り行った。

測定器：

米国ETS社製

Static Decay Meter Model 406D

Federal Test Method 101C 4046に準拠

MIL-B-81705Cのテストスペックに記載

印加電圧 5000V

測定条件 26℃、12%RHに24時間放置したサンプルを用いて測定した。評価項目 5000V印加し、50%、10%の電位の減衰時間を測定した。

【0040】[実施例1] 前述したポリエステル(PET)フィルムの裏面に、前記アイオノマーの水性分散液を塗布厚みが5 $\mu\text{m}$ となるように塗布し、100℃で1分間乾燥した。裏面及び表面について、帯電防止性を測定した。得られた結果を表1に示す。

【0041】[比較例1] ポリエステル(PET)フィルムに処理を施さずに、帯電防止性を測定した。得られた結果を表1に示す。

【0042】[実施例2] 前述した低密度ポリエチレン(LDPE)フィルムの裏面に、前記アイオノマーの水性分散液を塗布厚みが10 $\mu\text{m}$ となるように塗布し、100℃で1分間乾燥した。裏面及び表面について、帯電防止性を測定した。得られた結果を表1に示す。

【0043】[比較例2] 低密度ポリエチレン(LDPE)フィルムに処理を施さずに、帯電防止性を測定した。得られた結果を表1に示す。

【0044】[比較例3] 前述した低密度ポリエチレン(LDPE)フィルムの裏面に、前記界面活性剤型帯電防止液を塗布厚みが10 $\mu\text{m}$ となるように塗布し、100℃で1分間乾燥した。裏面及び表面について、帯電防止性を測定した。得られた結果を表1に示す。

【0045】

【表1】

11		12					
例		正電圧印加			負電圧印加		
		初期電圧 (V)	CutOff (%)	減衰時間 (S)	初期電圧 (V)	CutOff (%)	減衰時間 (S)
比較例1	PET7μA	+4000	50	∞	+1250	50	∞
			10	∞		1	∞
実施例1	IOD/PET 塗布面	+4000	50	0.73	-3750	50	0.81
			10	12.5		10	12
	IOD/PET 裏面	+3500	50	0.43	-3500	50	0.53
			10	10.28		10	10.86
比較例2	LDPE7μA	+1800	50	∞	-1000	50	∞
			10	∞		10	∞
実施例2	IOD/LDPE 塗布面	+4000	50	0.11	-4000	50	0.11
			10	1.38		10	1.39
	IOD/LDPE 裏面	+4000	50	0.1	-4000	50	0.1
			10	1.72		10	1.74
比較例3	QN/LDPE 表面	+4000	50	0.1	-2000	50	0.1
			10	1.12		10	1.22
	QN/LDPE 裏面	+2000	50	∞	-1100	50	∞
			10	∞		10	∞

上記の結果によると、界面活性剤型帯電防止液では、塗布面では良好な帯電防止性能を示すものの、裏面では帯電防止性能が発現していないのに対して、本発明で用いる特定のアイオノマー分散液では、塗布面の反対面でも帯電防止性能が発現され、しかも両面での電位減衰時間の差異は非常に小さいことが理解される。また、フィルム表面の物性を変化させることなしに、帯電防止性を付与でき、しかも正電荷及び負電荷の何れをも除電できることが明らかである。

【0046】

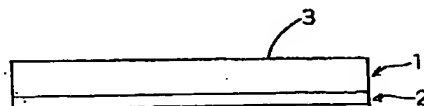
【発明の効果】本発明によれば、カリウム及びアルカノールアミン中和型アイオノマー或いはカリウム中和型アイオノマーとグリセリンまたは分子量250以下のポリ\*

30\*エチレングリコールとの組成物をシート状物の裏面にコートすることにより、シート状物の表面に何らの処理を施すことなしにも帯電防止性を付与することができる。本発明では、シート状物の裏面にコート層を設けることにより、表面に優れた帯電防止効果が付与されると共に、帯電防止性能の付与が表面への印刷等の加工の妨げとならないという利点が得られ、しかも正電荷に対しても負電荷に対しても共に有効に除電が行われるという利点もある。

【図面の簡単な説明】

【図1】本発明の帯電防止シート状物の断面構造の一例を示す断面図である。

【図1】



フロントページの続き

(51)Int.Cl. <sup>7</sup>	識別記号	F I	ターム(参考)
C 0 9 K 3/16	1 0 2	C 0 9 K 3/16	1 0 2 L
// C 0 8 L 101:00		C 0 8 L 101:00	

F ターム(参考) 4F006 AA11 AA12 AA31 AA35 AB24  
AB32 BA07 DA04  
4F100 AH02B AK01A AK42 AK54B  
AK70B AL05B AL06B AT00A  
BA02 CC00B EH46 JA20B  
JB16A JG03 JG03A YY00B



# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-120342

(43)Date of publication of application : 23.04.2002

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(51)Int.Cl.

B32B 27/32  
B32B 7/02  
C08J 7/04  
C09K 3/16  
// C08L101:00

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(21)Application number : 2000-316921

(71)Applicant : DU PONT MITSUI POLYCHEM CO LTD

(22)Date of filing : 17.10.2000

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## (54) ANTISTATIC SHEETLIKE ARTICLE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an antistatic sheetlike article having excellent antistatic effect applied to its surface by providing a coating layer to the back surface of a sheetlike article and not obstructing processing such as printing or the like by the application of antistatic capacity.

**SOLUTION:** The antistatic sheetlike article consists of a sheetlike article and a coating layer of a composition, which comprises a potassium and alkanolamine neutralized type ionomer or a potassium neutralized ionomer and glycerine or polyethylene glycol with a mol.wt. of 250 or less, and antistatic properties are applied to the surface of the sheetlike article.

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## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

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**CLAIMS**

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[Claim(s)]

[Claim 1] An antistatic sheet-like object characterized by for a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization ionomer given to a rear face of a sheet-like object which has the surface and a rear face, and this sheet-like object, a glycerol, or molecular weight consisting of a coat layer of a constituent with 250 or less polyethylene glycol, and giving antistatic nature to the surface of a sheet-like object.

[Claim 2] An antistatic sheet-like object according to claim 1 with which unsaturated-carboxylic-acid contents are ethylene and the unsaturated-carboxylic-acid copolymer (A) which is 10 - 35 % of the weight, and base resin of an ionomer is characterized by being neutralized by alkanolamine of an amount which is neutralized by potassium ion of an amount which corresponds to 70 - 100-mol% on the basis of a carboxyl group of this copolymer, and corresponds to 1 - 40-mol%.

[Claim 3] An antistatic sheet-like object according to claim 1 with which base resin of an ionomer be neutralize with potassium ion of an amount which unsaturated carboxylic acid contents be ethylene and the unsaturated carboxylic acid copolymer (A) which be 10 - 35 % of the weight, and correspond to 70 - 100-mol% on the basis of a carboxyl group of this copolymer, and a glycerol or molecular weight be characterize by 250 or less polyethylene glycol contain in the range of 0.1 - 9 % of the weight of copolymer (A) hits.

[Claim 4] An antistatic sheet-like object given in claim 1 thru/or any of 3 they are. [ which is characterized by said sheet-like object being a thermoplastics film ]

[Claim 5] An antistatic sheet-like object given in claim 1 thru/or any of 4 they are. [ which is characterized by being formed by thickness said whose coat layers are 0.1 thru/or 20 micrometers ]

[Claim 6] An antistatic sheet-like object given in claim 1 thru/or any of 5 they are. [ which is characterized by giving said coat layer in a form of aqueous dispersion liquid ]

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

**[0001]**

**[The technical field to which invention belongs]** This invention relates to the sheet-like object with which antistatic nature was completely given to details more also without processing in the surface by preparing the coat layer of a specific resin constituent in the rear face of a sheet-like object about an antistatic sheet-like object.

**[0002]**

**[Description of the Prior Art]** When dealing with plastics, fiber, paper, etc., and these are charged, the various static electricity failures may be caused. In order to prevent this, generally the antistatic agent is used. As an antistatic agent, a low-molecular mold organic compound like the surfactant of an anion system, a cation system, and the Nonion system is known, and they are used for the high molecular compound which constitutes a material using the translatability to the surface, applying these on the surface of a moldings, or blending them.

**[0003]** Since such a low-molecular mold antistatic agent has a problem in the durability of effect, using a macromolecule mold antistatic agent is also performed. In order to form a thin electrification tightness film in the moldings surface with the method of blending with the high molecular compound which constitutes a material also in this case, the method of applying a liquefied antistatic agent is adopted.

**[0004]** The technique of applying a liquefied antistatic agent has some dominance points compared with the method of blending with the high molecular compound which constitutes a material. For example, when a macromolecule mold antistatic agent is blended, a possibility that the physical properties of mold goods will change a lot with the poor compatibility may be high, and the fabrication itself may become impossible depending on the case. On the other hand, a spreading type antistatic agent can give sufficient un-charging nature only for the surface, without completely influencing logy [ of mold goods / MORUHO ]. Moreover, if a spreading type thing is used to using a lot of antistatic agents to a workpiece, small quantity required to form the layer of a several micrometers surface is sufficient for the thing which is actually necessity with a combination type. The aquosity dispersion liquid in consideration of a spreading mold antistatic agent with such an advantageous point especially environment, and handling nature could expect various antistatic uses, and the antistatic dispersion liquid of various classes have been developed.

**[0005]** As one of such the liquefied macromolecule mold antistatic agents, the aquosity dispersion liquid of the potassium salt of ethylene and an unsaturated-carboxylic-acid copolymer are known. Although these aquosity dispersion liquid can form the spreading film excellent in the durability of the antistatic effect, they have in dryness the defect that un-charging nature falls. The method of adding polyoxy alkylene glycol and a multiple-valued hydroxyl-group content compound to aquosity dispersion liquid is proposed in each official report of JP,4-339849,A or JP,8-231791,A in order to improve such a defect.

**[0006]** The resin constituent of the ionomer of a potassium salt mold and polyhydric alcohol is extruded as an interlayer, and manufacturing a protection-against-dust nature layered product is also already known. To JP,10-193495,A In the layered product which consists of a three or more-layer layer whose at least one layer of a surface layer is a thermoplastics layer To at least one interlayer who adjoins this thermoplastics layer, thermoplastics (A), It consists of the potassium ionomer (B) and polyhydroxy compound (C) of ethylene and an unsaturated-carboxylic-acid copolymer. The protection-against-dust nature layered product which comes to prepare non-charged \*\*\*\* with which it comes to mix (B) (C) at 0.1 - 30% of the weight of a rate to (B) is indicated to at least 5 % of the weight or more.

[0007]

[Problem(s) to be Solved by the Invention] It is common to apply an antistatic agent to the surface which should carry out electrification prevention as it accepts to the above-mentioned conventional technology in the antistatic treatment of a sheet-like object. However, although it is necessary to perform processing of printing etc. to the film surface, spreading of an antistatic agent tends to produce problems, such as causing poor printing.

[0008] Although giving the antistatic engine performance to the surface resin layer of a layered product by preparing an ionomer constituent as an interlayer gives the outstanding advantage of not spoiling printing nature to a surface resin layer, with the means of this conventional technology, the troublesome actuation of an interlayer's extrusion and laminating is required, and to be able to give the antistatic engine performance to sheet-like objects, such as a film, with means, such as easier coating, is desired.

[0009] this invention — a person — \*\* — a potassium — and — alkanolamine — neutralization — a mold — an ionomer — or — a potassium — neutralization — an ionomer — a glycerol — or — molecular weight — 250 — less than — a polyethylene glycol — a constituent — a sheet — \*\* — an object — a rear face — a coat — carrying out — things — a sheet — \*\* — an object — the surface — any — processing — giving — things — nothing — antistatic — a sex — it can give — things — having That is, the purpose of this invention has grant of the antistatic engine performance in offering the antistatic sheet-like object used as the hindrance of processings, such as printing, while the antistatic effect which was excellent in the surface by preparing a coat layer in the rear face of a sheet-like object is given.

[0010]

[Means for Solving the Problem] According to this invention, a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization ionomer given to a rear face of a sheet-like object which has the surface and a rear face, and this sheet-like object, a glycerol, or molecular weight consists of a coat layer of a constituent with 250 or less polyethylene glycol, and an antistatic sheet-like object characterized by giving antistatic nature to the surface of a sheet-like object is offered. By antistatic sheet-like object of this invention, base resin of 1. ionomer is ethylene and the unsaturated-carboxylic-acid copolymer (A) whose unsaturated-carboxylic-acid content is 10 – 35 % of the weight, and is based on a carboxyl group of this copolymer. It is neutralized by alkanolamine of an amount which corresponds to potassium ion of an amount, and 1–40–mol% which corresponds to 70–100–mol%, 1. Base resin of an ionomer is ethylene and the unsaturated-carboxylic-acid copolymer (A) whose unsaturated-carboxylic-acid content is 10 – 35 % of the weight, and is based on a carboxyl group of this copolymer. potassium ion of an amount which corresponds to 70–100–mol% neutralizes — having — a glycerol or molecular weight — 250 or less polyethylene glycol — this copolymer — (— containing in per [ A ] / 0.1 ] thru/or 9% of the weight of an amount — And a thing neutralized by alkanolamine of an amount which corresponds to 1–40–mol%, 3. That said sheet-like object is a thermoplastics film, being formed by thickness whose 4. aforementioned coat layers' are 0.1 thru/or 20 micrometers, and giving [ 5. aforementioned coat layer ]—in form of aqueous dispersion liquid \*\* are desirable.

[0011]

[Embodiment of the Invention] [Operation] this invention is based on the knowledge that antistatic nature is given to the surface also without any processing, when the coating constituent, the potassium neutralization ionomer and the glycerol, or molecular weight containing a potassium and an alkanolamine neutralization mold ionomer gives a coating constituent with 250 or less polyethylene glycol to the rear face of a sheet-like object. That is, in this invention, although it stands to reason very that the antistatic engine performance is given to the spreading side of an antistatic agent, the antistatic engine performance is given to not only the spreading side of a coating constituent but the surface which is a field of the opposite side of a spreading side as shown in the example mentioned later. And grant of this antistatic engine performance is completely similarly performed to negative electrification also to positive electrification.

[0012] The antistatic engine performance of the sheet-like object surface can be evaluated by finding time amount until it electrifies the surface which should be measured in predetermined surface potential, it measures the damping property of the surface potential by the passage of time after that and surface potential declines on fixed level.

[0013] Although the antistatic engine performance of a spreading side may be enough satisfied when the antistatic agent of the surfactant system currently widely used for electrification prevention of a resin

Plastic solid is applied to a sheet-like object When said coating constituent is given to a sheet-like object to infinite one (refer to the example of a comparison mentioned later), the surface potential half line of a spreading side and the field of the opposite side Not to mention a spreading side, it is that by which the surface potential half line in the surface of the opposite side is also controlled at 1 or less second (refer to the example mentioned later), and this is an unexpected effect by this invention.

[0014] In this invention, it is found out as a phenomenon as a result of much experiments that the coating layer given to the rear face controls electrification of the surface effectively, and the reason is not yet clear enough. However, according to the guess of this invention persons, the coat layer containing the potassium used for this invention and an alkanolamine neutralization mold ionomer is excellent in the developmental potency of a charge (an electron, electron hole) and the transportability of a charge by charge induction, an opposite charge (an electron hole, electron) is guided to a rear face corresponding to surface charge, an internal field is formed quickly, and this is considered to be useful, relaxation thru/or disappearance, i.e., electrification prevention, of external electric field. This is supported by the fact that attenuation of surface potential arises quickly also to negative electrification also to positive electrification. This may be related to existence of two kinds of counter cations called potassium ion and alkanolamine. In 250 or less polyethylene glycol, the device of others [ molecular weight / a potassium neutralization ionomer, a glycerol, or ] may be involving. Of course, the above-mentioned presumption does not restrain this invention in a certain semantics.

[0015] The antistatic sheet-like object of [antistatic nature sheet-like object] this invention consists of a sheet-like object 1 and a coat layer 2 given to the rear face as it is shown in drawing 1 . This coat layer 2 is formed from the constituent with the coating constituent containing a potassium and an alkanolamine neutralization mold ionomer, a potassium neutralization ionomer and a glycerol, or a with a molecular weight of 250 or less polyethylene glycol, and antistatic nature is given to the surface 3 of the sheet-like object 1 also without any processing.

[0016] The coating constituent used for [coat layer constituent] this invention contains the constituent with a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization ionomer, a glycerol, or a with a molecular weight of 250 or less polyethylene glycol.

(1) Although its all are usable if the potassium neutralization ionomer used for a potassium and alkanolamine neutralization mold ionomer this invention contains potassium ion and alkanolamine as a cation kind, it is the point of antistatic nature and it is desirable that it is what uses as the base the ethylene and the unsaturated-carboxylic-acid copolymer (A) whose unsaturated-carboxylic-acid content is 10 – 35 % of the weight.

[0017] As the ethylene and an unsaturated-carboxylic-acid copolymer used as the base polymer of this ionomer, an unsaturated-carboxylic-acid content is 12 – 30% of the weight of a copolymer preferably ten to 35% of the weight. If there are too few unsaturated-carboxylic-acid contents in a copolymer, it will become difficult for obtaining dispersion liquid with good dispersibility and stability to form a spreading film with good antistatic nature difficultly. If a copolymer with more unsaturated-carboxylic-acid contents than the above-mentioned range is used, since stable dispersion liquid are not not only obtained, but the water resisting property of the spreading film formed and the fall of a mechanical strength will take place on the other hand, it is not desirable. such ethylene and an unsaturated-carboxylic-acid copolymer — the duality of ethylene and unsaturated carboxylic acid — the plural copolymers with which copolymerization of other monomers was carried out not only to a copolymer but to arbitration — you may be — other monomers of arbitration — for example, copolymerization may be preferably carried out in 0 – 20% of the weight of the amount zero to 40% of the weight.

[0018] As unsaturated carboxylic acid, an acrylic acid, a methacrylic acid, an ETAKURIRU acid, a maleic acid, a fumaric acid, an itaconic acid, a maleic anhydride, itaconic acid anhydride, maleic-acid monomethyl, maleic-acid monoethyl, etc. can be illustrated here. Especially a desirable thing is an acrylic acid or a methacrylic acid.

[0019] As other monomers by which copolymerization may be carried out to the above-mentioned arbitration, unsaturated-carboxylic-acid ester, such as vinyl ester like vinyl acetate and propionic-acid vinyl, a methyl acrylate, an ethyl acrylate, acrylic-acid isopropyl, isobutyl acrylate, acrylic-acid n butyl, acrylic-acid iso octyl, 2-ethylhexyl acrylate, a methyl methacrylate, ethyl methacrylate, methacrylic-acid isobutyl, maleic-acid dimethyl, and a diethyl maleate, a carbon monoxide, a sulfur dioxide, etc. can be illustrated.

[0020] As ethylene and an unsaturated-carboxylic-acid copolymer, it is desirable for the melt flow rate in 190 degrees C and 2160g load to use [ 1-2000g / ] the thing of the range for 10-1500g / 10 minutes preferably for 10 minutes again. That is, if a thing with the very large value is used difficultly [ obtaining good dispersion liquid ] when the very low thing of a melt flow rate is used, since the reinforcement of the spreading film obtained from a solution runs short, it is not desirable.

[0021] These ethylene copolymer can be obtained by copolymerizing the monomer to constitute by the high-pressure radical polymerization method.

[0022] Ionomer resin components are the 70-100-mol potassium ion of % and the amount which corresponds to 75-98-mol% preferably, and 1-40-mol % and the thing which it comes to neutralize by 5-30-mol % of alkanolamine preferably on the basis of the carboxyl group of the above-mentioned ethylene copolymer.

[0023] That is, instead of potassium ion, even if it uses a lithium ion and sodium ion, the solution which can generate the spreading film excellent in antistatic nature cannot be obtained. Moreover, if the solution which can form a spreading film with good antistatic nature similarly if the amount of potassium ion becomes less than said range cannot be obtained and the amount crosses said range, stable dispersion liquid cannot be obtained.

[0024] On the other hand, as alkanolamine which is the neutralization component of another side, it is the following general formula (1).

$R' - R$  is an alkylene group among a 3-n-N-(ROH) n type, n is the number of 1 thru/or 3, it comes out and the thing whose  $R'$  is a hydrogen atom or an alkyl group and which is shown is used. Also in this, diethanolamine, dipropanolamine, a JIPENTA Norian amine, N-methylethanol amine, and N-ethyl propanolamine are desirable, and diethanolamine is the most desirable.

[0025] The above-mentioned alkanolamine is used by the quantitative ratio mentioned above. Since the antistatic engine performance, especially the antistatic engine performance under low humidity conditions fall also when fewer than the above-mentioned range also when there are more amounts of alkanolamine than the above-mentioned range and, it is not desirable.

[0026] (2) As for the coating constituent to a coating constituent sheet-like object, consisting of aqueous dispersion liquid is desirable. In order to manufacture these dispersion liquid, the aqueous dispersion liquid containing the potassium and alkanolamine neutralization object of the above-mentioned base polymer are manufactured. In order to manufacture these aqueous dispersion liquid, a simultaneous adding method and a serial addition method are used. That is, by the simultaneous adding method, quantum use of ethylene and (meta) an acrylic-acid copolymer, and the potassium compound and alkanolamine of a raw material is carried out everywhere, and it is 95 degrees C or more in temperature preferably, and 80 degrees C or more are obtained by making it react underwater, agitating. A hydroxide, a carbonate, a hydrogencarbonate, carboxylate, etc. can be illustrated as a potassium compound here.

[0027] The ethylene and (meta) the acrylic-acid copolymer of the description which the amount from which water and solid part concentration become 10 - 30 % of the weight preferably five to 40% of the weight in this method described above, It is based on the carboxyl group of this copolymer. The above-mentioned potassium compound of % of the amount of 70-100 mols to ionize, An aqueous dispersing element can be obtained by making it react, applying shearing force for the alkanolamine of the amount mentioned above at predetermined temperature among an autoclave with an agitator. Although reaction time changes also with reaction temperature or other reaction conditions, it is about 30 - 120 minutes. By the simultaneous adding method, addition actuation and reaction actuation are easy, processing is also easy actuation, and there is an advantage that a manufacturing cost is also low.

[0028] The aqueous dispersion liquid obtained in this way have preferably 1-500nm of mean particle diameter in the range of 5-400nm, and 10 - 2000 mPa-s of viscosity is in the range of 50 - 1000 mPa-s preferably. Of course, the aqueous dispersion liquid used as a raw material can be serially manufactured also with an addition method, and should just blend alkanolamine with the aqueous dispersion liquid of the potassium ion neutralization object of the ethylene and the unsaturated-carboxylic-acid copolymer prepared beforehand in this case.

[0029] In this invention, a constituent with a potassium neutralization mold ionomer, a glycerol, or a with a molecular weight of 250 or less polyethylene glycol can be used instead of a potassium and an alkanolamine neutralization mold ionomer. The thing of the potassium neutralization obtained with the means mentioned above as an ionomer of a potassium neutralization mold is used. Also among polyhydric

alcohol, it is important to use a glycerol or a polyethylene glycol, for example, the antistatic nature should be satisfied with the bottom of low humidity conditions of nature is not obtained in having used the polypropylene glycol. Moreover, when using a polyethylene glycol, it is important that molecular weight is also 250 or less, and the antistatic nature it should be satisfied with the bottom of low humidity conditions of nature too is not obtained in having used the polyethylene glycol with larger molecular weight than the above-mentioned range. The above-mentioned glycerol or a polyethylene glycol unsaturated-carboxylic-acid copolymer [ ethylene and ] (A) Hits, and is used in 0.1 – 9% of the weight of an amount. Since the antistatic engine performance under low humidity conditions falls also when fewer than the above-mentioned range also when there are more these amounts than the above-mentioned range and, it is not desirable.

[0030] In this invention, that solid content concentration can be adjusted by a request removing the moisture contained in water [ being manufactured ] nature liquid out of a system with means, such as azeotropic distillation, or diluting these aqueous dispersion liquid with water. antistatic [ which is used for this invention ] — service water — as for sex dispersion liquid, it is desirable that solid content concentration is in 10 thru/or the range which are 20 thru/or especially 30 % of the weight 40% of the weight in respect of the antistatic engine performance or spreading nature.

[0031] antistatic [ which is used for this invention ] — business — various additives can be blended with dispersion liquid at arbitration. Other organic solvents, such as ester like lower alcohol like other polyhydric alcohol, such as ethylene glycol, an epoxy compound, a methanol, ethanol, n propanol, and isopropanol as an example of such an additive, propylene glycol mono-acetate, and ethylene glycol mono-acetate, an anti-oxidant, an ultraviolet ray absorbent, light stabilizer, a plasticizer, a pigment, a color, lubricant, an antiblocking agent, adhesives, an antimicrobial agent, a cross linking agent, a note nature amelioration agent, an inorganic bulking agent, a foaming agent, etc. can be mentioned.

[0032] This organic solution can be used again, mixing with the solution of other polymers thru/or dispersion liquid, for example, is the purpose which raises the shelf life in low temperature, and can mix other polymer solutions thru/or dispersion liquid. In this case, the mixing ratio of a polymer solution besides above-mentioned water nature liquid/or dispersion liquid is good to be referred to as 99.9 / 0.1 – 90/10 by solid part conversion (weight ratio).

[0033] As such other solutions thru/or dispersion liquid of a polymer For example, polyvinyl acetate, an ethylene-vinylacetate copolymer, a polyvinyl chloride, A polyvinylidene chloride, water-soluble acrylic resin, acrylamide resin, meta-acrylamide resin, Acrylonitrile resin, meta-acrylonitrile resin, a styrene acrylic-acid copolymer, Water-soluble polyurethane resin, a water-soluble styrene maleic-acid copolymer, a styrene butadiene copolymer, High-impact-polystyrene resin, butadiene resins, polyester resin, An acrylonitrile butadiene copolymer, polyethylene, oxidation polyethylene, Solutions, such as a propylene ethylene copolymer, maleic-anhydride graft polyolefine, chlorinated polyethylene, chlorination polypropylene, EPDM, phenol resin, silicone resin, and an epoxy resin, can be mentioned. Two or more sorts may be used as well as these.

[0034] In [sheet-like object] this invention, the laminated film thru/or sheet which consists of the various resin films thru/or sheet which is easy to be charged, fiber sheets, or these two sorts or more as a sheet-like object for giving antistatic nature can be mentioned. As such a sheet-like object, for example, high -, inside -, low-density polyethylene, a line — low density polyethylene, ethylene and an alpha olefin copolymer, and an ethylene-vinylacetate copolymer — Ethylene and (meta) an acrylic ester copolymer, ethylene and (meta) an acrylic-acid copolymer, or its ionomer, Ethylene, an acrylic acid and (meta) an acrylic ester copolymer, or its ionomer, polypropylene, poly1 butene, and poly4 methyl 1 pentene — an olefin polymer or a copolymer — [ like ] Polystyrene, high impact polystyrene, ABS mold resin, a styrene butadiene block copolymer, or styrene resin like the hydrogenation object, Polyester like polyethylene terephthalate and polybutylene terephthalate, The film thru/or sheet of thermoplastic polymers, such as mixture of nylon 6, a polyamide like Nylon 66, a polycarbonate, polyvinyl chlorides, and these arbitration rates, thru/or thermoplastic elastomer is mentioned. This film may be the laminated film thru/or sheet which a monolayer is sufficient as, of course, and consists of two or more resin layers. As a fiber sheet, olefin system resin, polyamide resin, polyester resin, acrylic resin, polyvinyl alcohol, the synthetic paper that consists of a chlorine content polymer, a nonwoven fabric sheet, a textile-fabrics sheet, etc. are mentioned. In order to raise the spreading nature of the coating constituent to a sheet-like object, \*\*\*\*\* which gives the surface of a sheet-like object to surface treatment well-known in itself, such as corona

treatment, ozonization, and flame treatment, as occasion demands is also made. Especially this invention is effective in electrification prevention of a resin film, and, as for the thickness of a resin film, generally, what has 10 thru/or the thickness of 200 micrometers is desirable.

[0035] In order to apply the dispersion liquid of an ionomer to a [formation of coat layer] sheet-like base material, it can coat with a well-known method, for example, roll coating, a bar coating machine, an air knife coating machine, brush coating, a spray coating cloth, etc., or the method immersed in the organic solution for coating in a base material can be adopted. An under coat agent may be applied to a base material in order to improve an adhesive property etc., and surface treatment may be performed. Although the thickness of a spreading film is arbitrary, 0.1–20 micrometers is usually 0.2–15 micrometers preferably. Bridge formation processing by electron beam irradiation may be performed to a spreading film for the purpose which improves a water resisting property, endurance, etc.

[0036]

[Example] An example is given to below and this invention is concretely explained to it. In addition, the constituent used for formation of the sheet-like object used in the example and a coat layer is as follows.

[0037] Sheet-like object: Polyester (PET) film trade name Toray Industries, Inc. make Lumiler thickness 55-micrometer low density polyethylene (LDPE)

Trade name Mitsui Chemicals, Inc. make Myra Son 16 thickness 46 micrometers [0038] constituent for coats: — ionomer aquosity dispersing element (IOD and notation): — base polymer Ethylene methacrylic-acid copolymer methacrylic-acid content 20 % of the weight and MFR 60g / 10min ion addition K ion per carboxyl group — 90 mol % diethanolamine The aquosity dispersing element surfactant mold [ of 25 % of the weight of 20 mol % resin concentration ] antistatic liquid Kao Corp. make Electro stripper QN [0039]

Evaluation of antistatic nature was performed as follows.

measuring instrument: — the product made from U.S. ETS — Static Decay Meter Model 406 DFederal Test Method 101C 4046 — the test spec. of conformity MIL-B-81705C — written applied voltage 5000V

Measuring condition It measured using 26 degrees C and the sample left in RH 12% for 24 hours. Evaluation criteria It impressed 5000V and the damping time of 50% and 10% of potential was measured.

[0040] The aquosity dispersion liquid of said ionomer were applied to the rear face of the polyester (PET) film which carried out the [example 1] above-mentioned so that spreading thickness might be set to 5 micrometers, and it dried for 1 minute at 100 degrees C. Antistatic nature was measured about a rear face and the surface. The obtained result is shown in a table 1.

[0041] Antistatic nature was measured without processing on the [example 1 of comparison] polyester (PET) film. The obtained result is shown in a table 1.

[0042] The aquosity dispersion liquid of said ionomer were applied to the rear face of the low-density-polyethylene (LDPE) film which carried out the [example 2] above-mentioned so that spreading thickness might be set to 10 micrometers, and it dried for 1 minute at 100 degrees C. Antistatic nature was measured about a rear face and the surface. The obtained result is shown in a table 1.

[0043] Antistatic nature was measured without processing on the [example 2 of comparison] low-density-polyethylene (LDPE) film. The obtained result is shown in a table 1.

[0044] Said surfactant mold antistatic liquid was applied to the rear face of the low-density-polyethylene (LDPE) film which carried out the [example 3 of comparison] above-mentioned so that spreading thickness might be set to 10 micrometers, and it dried for 1 minute at 100 degrees C. Antistatic nature was measured about a rear face and the surface. The obtained result is shown in a table 1.

[0045]

[A table 1]



例		正 電 圧 印 加			負 電 圧 印 加		
		初期電圧 (V)	CutOff (%)	減衰時間 (S)	初期電圧 (V)	CutOff (%)	減衰時間 (S)
比較例 1	PET718A	+4000	50	∞	+1250	50	∞
			10	∞		1	∞
実施例 1	IOD/PET 塗布面	+4000	50	0.73	-3750	50	0.81
			10	12.5		10	12
	IOD/PET 裏面	+3500	50	0.43	-3500	50	0.53
			10	10.28		10	10.86
比較例 2	LDPE718A	+1800	50	∞	-1000	50	∞
			10	∞		10	∞
実施例 2	IOD/LDPE 塗布面	+4000	50	0.11	-4000	50	0.11
			10	1.38		10	1.39
	IOD/LDPE 裏面	+4000	50	0.1	-4000	50	0.1
			10	1.72		10	1.74
比較例 3	QN/LDPE 表面	+4000	50	0.1	-2000	50	0.1
			10	1.12		10	1.22
	QN/LDPE 裏面	+2000	50	∞	-1100	50	∞
			10	∞		10	∞

According to the above-mentioned result, with surfactant mold antistatic liquid, although the good antistatic engine performance is shown in respect of spreading, to the antistatic engine performance not being discovered, the antistatic engine performance is discovered also in respect of [ of a spreading side ] opposite, and, moreover, it is understood by the specific ionomer dispersion liquid used by this invention with the rear face that the difference in the potential damping time in both sides is very small. Moreover, it is clear that antistatic nature can be given and both positive charge and a negative charge can moreover be discharged, without changing the physical properties on the surface of a film.

[0046]

[Effect of the Invention] performing any processing to the surface of a sheet-like object by carrying out the coat of the constituent with a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization mold ionomer, a glycerol, or a with a molecular weight of 250 or less polyethylene glycol to the rear face of a sheet-like object according to this invention — nothing — antistatic nature — it can give. In this invention, while the antistatic effect which was excellent in the surface by preparing a coat layer in the rear face of a sheet-like object is given, the advantage that grant of the antistatic engine performance does not serve as hindrance of processings, such as printing to the surface, is acquired, and there is also an advantage that moreover electric discharge is both effectively performed also to a negative charge also to positive charge.

[Translation done.]

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TECHNICAL FIELD

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[A technical field to which invention belongs] This invention relates to a sheet-like object with which antistatic nature was completely given to details more also without processing in the surface by preparing a coat layer of a specific resin constituent in a rear face of a sheet-like object about an antistatic sheet-like object.

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PRIOR ART

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[Description of the Prior Art] When dealing with plastics, fiber, paper, etc., and these are charged, the various static electricity failures may be caused. In order to prevent this, generally the antistatic agent is used. As an antistatic agent, a low-molecular mold organic compound like the surfactant of an anion system, a cation system, and the Nonion system is known, and they are used for the high molecular compound which constitutes a material using the translatability to the surface, applying these on the surface of a moldings, or blending them.

[0003] Since such a low-molecular mold antistatic agent has a problem in the durability of effect, using a macromolecule mold antistatic agent is also performed. In order to form a thin electrification tightness film in the moldings surface with the method of blending with the high molecular compound which constitutes a material also in this case, the method of applying a liquefied antistatic agent is adopted.

[0004] The technique of applying a liquefied antistatic agent has some dominance points compared with the method of blending with the high molecular compound which constitutes a material. For example, when a macromolecule mold antistatic agent is blended, a possibility that the physical properties of mold goods will change a lot with the poor compatibility may be high, and the fabrication itself may become impossible depending on the case. On the other hand, a spreading type antistatic agent can give sufficient un-charging nature only for the surface, without completely influencing logy [ of mold goods / MORUHO ]. Moreover, if a spreading type thing is used to using a lot of antistatic agents to a workpiece, small quantity required to form the layer of a several micrometers surface is sufficient for the thing which is actually necessity with a combination type. The aquosity dispersion liquid in consideration of a spreading mold antistatic agent with such an advantageous point especially environment, and handling nature could expect various antistatic uses, and the antistatic dispersion liquid of various classes have been developed.

[0005] As one of such the liquefied macromolecule mold antistatic agents, the aquosity dispersion liquid of the potassium salt of ethylene and an unsaturated-carboxylic-acid copolymer are known. Although these aquosity dispersion liquid can form the spreading film excellent in the durability of the antistatic effect, they have in dryness the defect that un-charging nature falls. The method of adding polyoxy alkylene glycol and a multiple-valued hydroxyl-group content compound to aquosity dispersion liquid is proposed in each official report of JP,4-339849,A or JP,8-231791,A in order to improve such a defect.

[0006] It is thermoplastics (A) to at least one interlayer who adjoins this thermoplastics layer in the layered product which the resin constituent of the ionomer of a potassium salt mold and polyhydric alcohol is extruded as an interlayer, and manufacturing a protection-against-dust nature layered product is also already known, and becomes JP,10-193495,A from the three or more-layer layer whose at least one layer of a surface layer is a thermoplastics layer. It consists of the potassium ionomer (B) and polyhydroxy compound (C) of ethylene and an unsaturated-carboxylic-acid copolymer, and the protection-against-dust nature layered product which comes to prepare non-charged \*\*\*\* with which it comes [ as opposed to / in (B) / (B) ] to mix (C) at 0.1 - 30% of the weight of a rate is indicated as opposed to at least 5 % of the weight or more.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] performing any processing to the surface of a sheet-like object by carrying out the coat of the constituent with a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization mold ionomer, a glycerol, or a with a molecular weight of 250 or less polyethylene glycol to the rear face of a sheet-like object according to this invention — nothing — antistatic nature — it can give . In this invention, while the antistatic effect which was excellent in the surface by preparing a coat layer in the rear face of a sheet-like object is given, the advantage that grant of the antistatic engine performance does not serve as hindrance of processings, such as printing to the surface, is acquired, and there is also an advantage that moreover electric discharge is both effectively performed also to a negative charge also to positive charge.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] It is common to apply an antistatic agent to the surface which should carry out electrification prevention as it accepts to the above-mentioned conventional technology in the antistatic treatment of a sheet-like object. However, although it is necessary to perform processing of printing etc. to the film surface, spreading of an antistatic agent tends to produce problems, such as causing poor printing.

[0008] Although giving the antistatic engine performance to the surface resin layer of a layered product by preparing an ionomer constituent as an interlayer gives the outstanding advantage of not spoiling printing nature to a surface resin layer, with the means of this conventional technology, the troublesome actuation of an interlayer's extrusion and laminating is required, and to be able to give the antistatic engine performance to sheet-like objects, such as a film, with means, such as easier coating, is desired.

[0009] this invention — a person — \*\* — a potassium — and — alkanolamine — neutralization — a mold — an ionomer — or — a potassium — neutralization — an ionomer — a glycerol — or — molecular weight — 250 — less than — a polyethylene glycol — a constituent — a sheet — \*\* — an object — a rear face — a coat — carrying out — things — a sheet — \*\* — an object — the surface — any — processing — giving — things — nothing — antistatic — a sex — it can give — things — having That is, the purpose of this invention has grant of the antistatic engine performance in offering the antistatic sheet-like object used as the hindrance of processings, such as printing, while the antistatic effect which was excellent in the surface by preparing a coat layer in the rear face of a sheet-like object is given.

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**MEANS**

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[Means for Solving the Problem] According to this invention, a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization ionomer given to a rear face of a sheet-like object which has the surface and a rear face, and this sheet-like object, a glycerol, or molecular weight consists of a coat layer of a constituent with 250 or less polyethylene glycol, and an antistatic sheet-like object characterized by giving antistatic nature to the surface of a sheet-like object is offered. By antistatic sheet-like object of this invention, base resin of 1. ionomer is ethylene and the unsaturated-carboxylic-acid copolymer (A) whose unsaturated-carboxylic-acid content is 10 - 35 % of the weight, and is based on a carboxyl group of this copolymer. It is neutralized by alkanolamine of an amount which corresponds to potassium ion of an amount, and 1-40-mol% which corresponds to 70-100-mol%, 1. Base resin of an ionomer is ethylene and the unsaturated-carboxylic-acid copolymer (A) whose unsaturated-carboxylic-acid content is 10 - 35 % of the weight, and is based on a carboxyl group of this copolymer. potassium ion of an amount which corresponds to 70-100-mol% neutralizes — having — a glycerol or molecular weight — 250 or less polyethylene glycol — this copolymer — (— containing in per [ A ) / 0.1 ] thru/or 9% of the weight of an amount — And a thing neutralized by alkanolamine of an amount which corresponds to 1-40-mol%, 3. That said sheet-like object is a thermoplastics film, being formed by thickness whose 4. aforementioned coat layers' are 0.1 thru/or 20 micrometers, and giving [ 5. aforementioned coat layer ]-in form of aqueous dispersion liquid \*\* are desirable.

[0011]

[Embodiment of the Invention]

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## OPERATION

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[Operation] this invention is based on the knowledge that antistatic nature is given to the surface also without any processing, when the coating constituent, the potassium neutralization ionomer and the glycerol, or molecular weight containing a potassium and an alkanolamine neutralization mold ionomer gives a coating constituent with 250 or less polyethylene glycol to the rear face of a sheet-like object. That is, in this invention, although it stands to reason very that the antistatic engine performance is given to the spreading side of an antistatic agent, the antistatic engine performance is given to not only the spreading side of a coating constituent but the surface which is a field of the opposite side of a spreading side as shown in the example mentioned later. And grant of this antistatic engine performance is completely similarly performed to negative electrification also to positive electrification.

[0012] The antistatic engine performance of the sheet-like object surface can be evaluated by finding time amount until it electrifies the surface which should be measured in predetermined surface potential, it measures the damping property of the surface potential by the passage of time after that and surface potential declines on fixed level.

[0013] Although the antistatic engine performance of a spreading side may be enough satisfied when the antistatic agent of the surfactant system currently widely used for electrification prevention of a resin Plastic solid is applied to a sheet-like object When said coating constituent is given to a sheet-like object to infinite one (refer to the example of a comparison mentioned later), the surface potential half line of a spreading side and the field of the opposite side Not to mention a spreading side, it is that by which the surface potential half line in the surface of the opposite side is also controlled at 1 or less second (refer to the example mentioned later), and this is an unexpected effect by this invention.

[0014] In this invention, it is found out as a phenomenon as a result of much experiments that the coating layer given to the rear face controls electrification of the surface effectively, and the reason is not yet clear enough. However, according to the guess of this invention persons, the coat layer containing the potassium used for this invention and an alkanolamine neutralization mold ionomer is excellent in the developmental potency of a charge (an electron, electron hole) and the transportability of a charge by charge induction, an opposite charge (an electron hole, electron) is guided to a rear face corresponding to surface charge, an internal field is formed quickly, and this is considered to be useful, relaxation thru/or disappearance, i.e., electrification prevention, of external electric field. This is supported by the fact that attenuation of surface potential arises quickly also to negative electrification also to positive electrification. This may be related to existence of two kinds of counter cations called potassium ion and alkanolamine. In 250 or less polyethylene glycol, the device of others [ molecular weight / a potassium neutralization ionomer, a glycerol, or ] may be involving. Of course, the above-mentioned presumption does not restrain this invention in a certain semantics.

[0015] The antistatic sheet-like object of [antistatic nature sheet-like object] this invention consists of a sheet-like object 1 and a coat layer 2 given to the rear face as it is shown in drawing 1 . This coat layer 2 is formed from the constituent with the coating constituent containing a potassium and an alkanolamine neutralization mold ionomer, a potassium neutralization ionomer and a glycerol, or a with a molecular weight of 250 or less polyethylene glycol, and antistatic nature is given to the surface 3 of the sheet-like object 1 also without any processing.

[0016] The coating constituent used for [coat layer constituent] this invention contains the constituent with a potassium and an alkanolamine neutralization mold ionomer or a potassium neutralization ionomer, a glycerol, or a with a molecular weight of 250 or less polyethylene glycol.

(1) Although its all are usable if the potassium neutralization ionomer used for a potassium and alkanolamine neutralization mold ionomer this invention contains potassium ion and alkanolamine as a cation kind, it is the point of antistatic nature and it is desirable that it is what uses as the base the ethylene and the unsaturated-carboxylic-acid copolymer (A) whose unsaturated-carboxylic-acid content is 10 – 35 % of the weight.

[0017] As the ethylene and an unsaturated-carboxylic-acid copolymer used as the base polymer of this ionomer, an unsaturated-carboxylic-acid content is 12 – 30% of the weight of a copolymer preferably ten to 35% of the weight. If there are too few unsaturated-carboxylic-acid contents in a copolymer, it will become difficult for obtaining dispersion liquid with good dispersibility and stability to form a spreading film with good antistatic nature difficultly. If a copolymer with more unsaturated-carboxylic-acid contents than the above-mentioned range is used, since stable dispersion liquid are not not only obtained, but the water resisting property of the spreading film formed and the fall of a mechanical strength will take place on the other hand, it is not desirable. such ethylene and an unsaturated-carboxylic-acid copolymer — the duality of ethylene and unsaturated carboxylic acid — the plural copolymers with which copolymerization of other monomers was carried out not only to a copolymer but to arbitration — you may be — other monomers of arbitration — for example, copolymerization may be preferably carried out in 0 – 20% of the weight of the amount zero to 40% of the weight.

[0018] As unsaturated carboxylic acid, an acrylic acid, a methacrylic acid, an ETAKURIRU acid, a maleic acid, a fumaric acid, an itaconic acid, a maleic anhydride, itaconic acid anhydride, maleic-acid monomethyl, maleic-acid monoethyl, etc. can be illustrated here. Especially a desirable thing is an acrylic acid or a methacrylic acid.

[0019] As other monomers by which copolymerization may be carried out to the above-mentioned arbitration, unsaturated-carboxylic-acid ester, such as vinyl ester like vinyl acetate and propionic-acid vinyl, a methyl acrylate, an ethyl acrylate, acrylic-acid isopropyl, isobutyl acrylate, acrylic-acid n butyl, acrylic-acid iso octyl, 2-ethylhexyl acrylate, a methyl methacrylate, ethyl methacrylate, methacrylic-acid isobutyl, maleic-acid dimethyl, and a diethyl maleate, a carbon monoxide, a sulfur dioxide, etc. can be illustrated.

[0020] As ethylene and an unsaturated-carboxylic-acid copolymer, it is desirable for the melt flow rate in 190 degrees C and 2160g load to use [ 1–2000g / ] the thing of the range for 10–1500g / 10 minutes preferably for 10 minutes again. That is, if a thing with the very large value is used difficultly [ obtaining good dispersion liquid ] when the very low thing of a melt flow rate is used, since the reinforcement of the spreading film obtained from a solution runs short, it is not desirable.

[0021] These ethylene copolymer can be obtained by copolymerizing the monomer to constitute by the high-pressure radical polymerization method.

[0022] Ionomer resin components are the 70–100–mol potassium ion of % and the amount which corresponds to 75–98–mol% preferably, and 1–40–mol % and the thing which it comes to neutralize by 5–30–mol % of alkanolamine preferably on the basis of the carboxyl group of the above-mentioned ethylene copolymer.

[0023] That is, instead of potassium ion, even if it uses a lithium ion and sodium ion, the solution which can generate the spreading film excellent in antistatic nature cannot be obtained. Moreover, if the solution which can form a spreading film with good antistatic nature similarly if the amount of potassium ion becomes less than said range cannot be obtained and the amount crosses said range, stable dispersion liquid cannot be obtained.

[0024] On the other hand, as alkanolamine which is the neutralization component of another side, it is the following general formula (1).

$R' - R$  is an alkylene group among a 3–n–N–(ROH) n type, n is the number of 1 thru/or 3, it comes out and the thing whose  $R'$  is a hydrogen atom or an alkyl group and which is shown is used. Also in this, diethanolamine, dipropanolamine, a JIPENTA Norian amine, N-methylethanol amine, and N-ethyl propanolamine are desirable, and diethanolamine is the most desirable.

[0025] The above-mentioned alkanolamine is used by the quantitative ratio mentioned above. Since the antistatic engine performance, especially the antistatic engine performance under low humidity conditions fall also when fewer than the above-mentioned range also when there are more amounts of alkanolamine than the above-mentioned range and, it is not desirable.

[0026] (2) As for the coating constituent to a coating constituent sheet-like object, consisting of aquosity



dispersion liquid is desirable. In order to manufacture these dispersion liquid, the aqueous dispersion liquid containing the potassium and alkanolamine neutralization object of the above-mentioned base polymer are manufactured. In order to manufacture these aqueous dispersion liquid, a simultaneous adding method and a serial addition method are used. That is, by the simultaneous adding method, quantum use of ethylene and (meta) an acrylic-acid copolymer, and the potassium compound and alkanolamine of a raw material is carried out everywhere, and it is 95 degrees C or more in temperature preferably, and 80 degrees C or more are obtained by making it react underwater, agitating. A hydroxide, a carbonate, a hydrogencarbonate, carboxylate, etc. can be illustrated as a potassium compound here.

[0027] The ethylene and (meta) the acrylic-acid copolymer of the description which the amount from which water and solid part concentration become 10 – 30 % of the weight preferably five to 40% of the weight in this method described above, [It is based on the carboxyl group of this copolymer. The above-mentioned potassium compound of % of the amount of 70–100 mols to ionize, An aqueous dispersing element can be obtained by making it react, applying shearing force for the alkanolamine of the amount mentioned above at predetermined temperature among an autoclave with an agitator. Although reaction time changes also with reaction temperature or other reaction conditions, it is about 30 – 120 minutes. By the simultaneous adding method, addition actuation and reaction actuation are easy, processing is also easy actuation, and there is an advantage that a manufacturing cost is also low.

[0028] The aqueous dispersion liquid obtained in this way have preferably 1–500nm of mean particle diameter in the range of 5–400nm, and 10 – 2000 mPa·s of viscosity is in the range of 50 – 1000 mPa·s preferably. Of course, the aqueous dispersion liquid used as a raw material can be serially manufactured also with an addition method, and should just blend alkanolamine with the aqueous dispersion liquid of the potassium ion neutralization object of the ethylene and the unsaturated-carboxylic-acid copolymer prepared beforehand in this case.

[0029] In this invention, a constituent with a potassium neutralization mold ionomer, a glycerol, or a with a molecular weight of 250 or less polyethylene glycol can be used instead of a potassium and an alkanolamine neutralization mold ionomer. The thing of the potassium neutralization obtained with the means mentioned above as an ionomer of a potassium neutralization mold is used. Also among polyhydric alcohol, it is important to use a glycerol or a polyethylene glycol, for example, the antistatic nature should be satisfied with the bottom of low humidity conditions of nature is not obtained in having used the polypropylene glycol. Moreover, when using a polyethylene glycol, it is important that molecular weight is also 250 or less, and the antistatic nature it should be satisfied with the bottom of low humidity conditions of nature too is not obtained in having used the polyethylene glycol with larger molecular weight than the above-mentioned range. The above-mentioned glycerol or a polyethylene glycol unsaturated-carboxylic-acid copolymer [ ethylene and ] (A) Hits, and is used in 0.1 – 9% of the weight of an amount. Since the antistatic engine performance under low humidity conditions falls also when fewer than the above-mentioned range also when there are more these amounts than the above-mentioned range and, it is not desirable.

[0030] In this invention, that solid content concentration can be adjusted by a request removing the moisture contained in water [ being manufactured ] nature liquid out of a system with means, such as azeotropic distillation, or diluting these aqueous dispersion liquid with water. antistatic [ which is used for this invention ] — service water — as for sex dispersion liquid, it is desirable that solid content concentration is in 10 thru/or the range which are 20 thru/or especially 30 % of the weight 40% of the weight in respect of the antistatic engine performance or spreading nature.

[0031] antistatic [ which is used for this invention ] — business — various additives can be blended with dispersion liquid at arbitration. Other organic solvents, such as ester like lower alcohol like other polyhydric alcohol, such as ethylene glycol, an epoxy compound, a methanol, ethanol, n propanol, and isopropanol as an example of such an additive, propylene glycol mono-acetate, and ethylene glycol mono-acetate, an anti-oxidant, an ultraviolet ray absorbent, light stabilizer, a plasticizer, a pigment, a color, lubricant, an antiblocking agent, adhesives, an antimicrobial agent, a cross linking agent, a note nature amelioration agent, an inorganic bulking agent, a foaming agent, etc. can be mentioned.

[0032] This organic solution can be used again, mixing with the solution of other polymers thru/or dispersion liquid, for example, is the purpose which raises the shelf life in low temperature, and can mix other polymer solutions thru/or dispersion liquid. In this case, the mixing ratio of a polymer solution besides above-mentioned water nature liquid/or dispersion liquid is good to be referred to as 99.9 / 0.1 –

90/10 by solid part conversion (weight ratio).

[0033] As such other solutions thru/or dispersion liquid of a polymer For example, polyvinyl acetate, an ethylene-vinylacetate copolymer, a polyvinyl chloride, A polyvinylidene chloride, water-soluble acrylic resin, acrylamide resin, meta-acrylamide resin, Acrylonitrile resin, meta-acrylonitrile resin, a styrene acrylic-acid copolymer, Water-soluble polyurethane resin, a water-soluble styrene maleic-acid copolymer, a styrene butadiene copolymer, High-impact-polystyrene resin, butadiene resins, polyester resin, An acrylonitrile butadiene copolymer, polyethylene, oxidation polyethylene, Solutions, such as a propylene ethylene copolymer, maleic-anhydride graft polyolefine, chlorinated polyethylene, chlorination polypropylene, EPDM, phenol resin, silicone resin, and an epoxy resin, can be mentioned. Two or more sorts may be used as well as these.

[0034] In [sheet-like object] this invention, the laminated film thru/or sheet which consists of the various resin films thru/or sheet which is easy to be charged, fiber sheets, or these two sorts or more as a sheet-like object for giving antistatic nature can be mentioned. As such a sheet-like object, for example, high -, inside -, low-density polyethylene, a line — low density polyethylene, ethylene and an alpha olefin copolymer, and an ethylene-vinylacetate copolymer — Ethylene and (meta) an acrylic ester copolymer, ethylene and (meta) an acrylic-acid copolymer, or its ionomer, Ethylene, an acrylic acid and (meta) an acrylic ester copolymer, or its ionomer, polypropylene, poly1 butene, and poly4 methyl 1 pentene — an olefin polymer or a copolymer — [ like ] Polystyrene, high impact polystyrene, ABS mold resin, a styrene butadiene block copolymer, or styrene resin like the hydrogenation object, Polyester like polyethylene terephthalate and polybutylene terephthalate, The film thru/or sheet of thermoplastic polymers, such as mixture of nylon 6, a polyamide like Nylon 66, a polycarbonate, polyvinyl chlorides, and these arbitration rates, thru/or thermoplastic elastomer is mentioned. This film may be the laminated film thru/or sheet which a monolayer is sufficient as, of course, and consists of two or more resin layers. As a fiber sheet, olefin system resin, polyamide resin, polyester resin, acrylic resin, polyvinyl alcohol, the synthetic paper that consists of a chlorine content polymer, a nonwoven fabric sheet, a textile-fabrics sheet, etc. are mentioned. In order to raise the spreading nature of the coating constituent to a sheet-like object, \*\*\*\*\* which gives the surface of a sheet-like object to surface treatment well-known in itself, such as corona treatment, ozonization, and flame treatment, as occasion demands is also made. Especially this invention is effective in electrification prevention of a resin film, and, as for the thickness of a resin film, generally, what has 10 thru/or the thickness of 200 micrometers is desirable.

[0035] In order to apply the dispersion liquid of an ionomer to a [formation of coat layer] sheet-like base material, it can coat with a well-known method, for example, roll coating, a bar coating machine, an air knife coating machine, brush coating, a spray coating cloth, etc., or the method immersed in the organic solution for coating in a base material can be adopted. An under coat agent may be applied to a base material in order to improve an adhesive property etc., and surface treatment may be performed. Although the thickness of a spreading film is arbitrary, 0.1–20 micrometers is usually 0.2–15 micrometers preferably. Bridge formation processing by electron beam irradiation may be performed to a spreading film for the purpose which improves a water resisting property, endurance, etc.

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**EXAMPLE**

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[Example] An example is given to below and this invention is concretely explained to it. In addition, the constituent used for formation of the sheet-like object used in the example and a coat layer is as follows.  
[0037] Sheet-like object: Polyester (PET) film trade name Toray Industries, Inc. make Lumiler thickness 55-micrometer low density polyethylene (LDPE)

Trade name Mitsui Chemicals, Inc. make Myra Son 16 thickness 46 micrometers [0038] constituent for coats: — ionomer aqueosity dispersing element (IOD and notation): — base polymer Ethylene methacrylic-acid copolymer methacrylic-acid content 20 % of the weight and MFR 60g / 10min ion addition K ion per carboxyl group — 90 mol % diethanolamine The aqueosity dispersing element surfactant mold [ of 25 % of the weight of 20 mol % resin concentration ] antistatic liquid Kao Corp. make Electro stripper QN [0039] Evaluation of antistatic nature was performed as follows.

measuring instrument: — the product made from U.S. ETS — Static Decay Meter Model 406 DFederal Test Method 101C 4046 — the test spec. of conformity MIL-B-81705C — written applied voltage 5000V Measuring condition It measured using 26 degrees C and the sample left in RH 12% for 24 hours. Evaluation criteria It impressed 5000V and the damping time of 50% and 10% of potential was measured.

[0040] The aqueosity dispersion liquid of said ionomer were applied to the rear face of the polyester (PET) film which carried out the [example 1] above-mentioned so that spreading thickness might be set to 5 micrometers, and it dried for 1 minute at 100 degrees C. Antistatic nature was measured about a rear face and the surface. The obtained result is shown in a table 1.

[0041] Antistatic nature was measured without processing on the [example 1 of comparison] polyester (PET) film. The obtained result is shown in a table 1.

[0042] The aqueosity dispersion liquid of said ionomer were applied to the rear face of the low-density-polyethylene (LDPE) film which carried out the [example 2] above-mentioned so that spreading thickness might be set to 10 micrometers, and it dried for 1 minute at 100 degrees C. Antistatic nature was measured about a rear face and the surface. The obtained result is shown in a table 1.

[0043] Antistatic nature was measured without processing on the [example 2 of comparison] low-density-polyethylene (LDPE) film. The obtained result is shown in a table 1.

[0044] Said surfactant mold antistatic liquid was applied to the rear face of the low-density-polyethylene (LDPE) film which carried out the [example 3 of comparison] above-mentioned so that spreading thickness might be set to 10 micrometers, and it dried for 1 minute at 100 degrees C. Antistatic nature was measured about a rear face and the surface. The obtained result is shown in a table 1.

[0045]

[A table 1]

例		正電圧印加			負電圧印加		
		初期電圧 (V)	CutOff (%)	減衰時間 (S)	初期電圧 (V)	CutOff (%)	減衰時間 (S)
比較例 1	PET718A	+4000	50	∞	+1250	50	∞
			10	∞		1	∞
実施例 1	IOD/PET 塗布面	+4000	50	0.73	-3750	50	0.81
			10	12.5		10	12
	IOD/PET 裏面	+3500	50	0.43	-3500	50	0.53
			10	10.28		10	10.86
比較例 2	LDPE718A	+1800	50	∞	-1000	50	∞
			10	∞		10	∞
実施例 2	IOD/LDPE 塗布面	+4000	50	0.11	-4000	50	0.11
			10	1.38		10	1.39
	IOD/LDPE 裏面	+4000	50	0.1	-4000	50	0.1
			10	1.72		10	1.74
比較例 3	QN/LDPE 表面	+4000	50	0.1	-2000	50	0.1
			10	1.12		10	1.22
	QN/LDPE 裏面	+2000	50	∞	-1100	50	∞
			10	∞		10	∞

According to the above-mentioned result, with surfactant mold antistatic liquid, although the good antistatic engine performance is shown in respect of spreading, to the antistatic engine performance not being discovered, the antistatic engine performance is discovered also in respect of [ of a spreading side ] opposite, and, moreover, it is understood by the specific ionomer dispersion liquid used by this invention with the rear face that the difference in the potential damping time in both sides is very small. Moreover, it is clear that antistatic nature can be given and both positive charge and a negative charge can moreover be discharged, without changing the physical properties on the surface of a film.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is the cross section showing an example of the cross-section structure of the antistatic sheet-like object of this invention.

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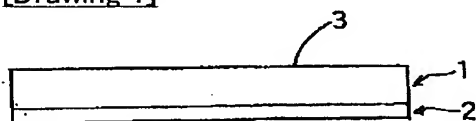
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DRAWINGS

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[Drawing 1]



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